

What is claimed is:

1. A pile anchor foundation for supporting a heavy load from a ground surface comprising a concrete foundation cap having a bottom surface engaged with said ground surface and an upper surface supporting a heavy load connected rigidly thereto and a plurality of elongated pile anchors depending from said cap, each of said pile anchors being constructed of cementitious material extending into underlying soil a substantial vertical depth below said foundation cap, each of said pile anchors including a tension member anchored thereto and extending upwardly through said cap, an upper end of each tension member including a post tensioning assembly thereon engaging an upper surface of said cap to pull said cap downwardly and compressing underlying soil forming said ground surface with the cap bearing on underlying compressed soil to withstand overturning and uplifting forces exerted on said cap by said heavy load connected to said cap.

2. The foundation as claimed in claim 1 wherein each tension member is an elongated bolt having a threaded upper end receiving a nut, a lower end portion of said bolt being anchored in said pile anchor, and a length of each bolt being movable in relation to said pile anchor and said cap to enable stretching of said bolt when the nut on the upper end thereof is tightened downwardly to pull said cap downwardly.

3. The foundation as claimed in claim 2 wherein each of said pile anchors includes a short length of compressible material at an upper end, said cap compressing said compressible material when being pulled downwardly by said nuts on the upper
5 ends of said tension bolts being tightened against said cap.

4. The foundation as claimed in claim 2 wherein each of said bolts includes a sleeve enclosing a substantial length thereof to prevent the portion of the bolt covered by said sleeve from bonding to said pile anchor and cap and facilitating said
10 post tensioning.

5. The foundation as claimed in claim 1 wherein said foundation cap is generally cylindrical and said elongated pile anchors are circumferentially spaced around said foundation cap.

6. The foundation as claimed in claim 1 wherein a
15 periphery of each said pile anchor is defined by a corrugated metal pipe for a substantial length thereof.

7. The foundation as claimed in claim 1 wherein a periphery of said concrete foundation cap is defined by a corrugated metal pipe.

8. A foundation for supporting a tower subject to high overturn loads which comprises a concrete cap defined by vertically spaced top and bottom surfaces and a peripheral wall, said cap adapted to be supported on an upwardly facing soil surface, fastening members rigidly securing a tower to said cap upper surface, a plurality of pile anchors depending from said bottom surface of said cap in circumferentially spaced relation, said pile anchors positioned in soil underlying said cap with each pile anchor being constructed of cementitious material and including an elongated tension bolt anchored therein and extending through said cap, and a nut threaded onto an upper end of each tension bolt and in contact with said top surface of said cap to pull said cap downwardly to compress soil underlying said cap to resist overturning and uplifting forces exerted on said cap by a supported tower.

9. The foundation as claimed in claim 8 wherein each of said fastening members includes a tower anchor bolt extending downwardly into said concrete cap, an embedment ring extending peripherally in said concrete cap and being positioned adjacent said bottom surface thereof, each of said anchor bolts having a lower end rigidly affixed to said embedment ring to anchor a supported tower to said cap.

10. The foundation as claimed in claim 9 wherein each of said anchor bolts include a tubular sleeve extending from said embedment ring to prevent said anchor bolts from bonding to said concrete cap.

5 11. The foundation as defined in claim 8 wherein each said pile anchor includes an elongated corrugated pipe filled with cementitious material with said tension bolt being centralized therein, each said tension bolt having a lower end anchored in said cementitious material, each said tension bolt being sleeved
10 over a major portion of its length to prevent bonding with the cementitious material of the pile anchor and said concrete cap to permit post tensioning of said tension bolts.

12. The foundation as claimed in claim 11 wherein each of said pile anchors includes a void space at the upper end of said
15 cementitious material, said void space being filled with crushable material to enable the concrete cap to be pulled downwardly to compress and consolidate underlying soil to desired strengths and to permit the pile anchors to move upward to develop skin friction resistance equal to the pile anchor bolt
20 post tension.

13. The foundation as claimed in claim 8 wherein said concrete cap includes a grout trough in said top surface to receive and set a supported tower flange in grout in said grout trough by a template bottom ring, blockout members supporting
5 said tower flange at spaced points in said trough while grout is poured into the grout trough under the tower flange, leveling nuts on said fastening members engaged with said tower flange to support the tower flange to enable curing of said grout.

14. The foundation as claimed in claim 13 wherein said
10 leveling nuts can be lowered within void spaces formed by removing said blockout members to enable said tower anchor bolts on which the lowered leveling nuts are threaded to be elongated by post tensioning.

15. The method of forming a pile anchor foundation for
15 supporting a heavy load from a ground surface comprising the steps of driving pile anchor pipes into a ground surface, placing pile anchor bolts having sleeves thereon longitudinally in said pipes with the pile anchor bolts extending above an upper end of said pipes, filling the pipes with cementitious material,
20 allowing said cementitious material to cure, placing load anchor bolts generally parallel to said pipe anchor bolts, pouring a concrete cap foundation above the upper ends of said pile anchor

pipes and in contact with the upper ends of said sleeved pile anchor bolts and said load anchor bolts, allowing said cap foundation to cure, post tensioning said pile anchor bolts, placing a support flange of a heavy load onto the upper ends of said load anchor bolts and post tensioning said load anchor bolts with said support flange attached thereto.

16. The method as claimed in claim 15 wherein the step of pouring the concrete cap foundation includes the step of forming a grout trough in a top surface of said concrete cap foundation with said load anchor bolts extending through said trough, supporting said support flange on said load anchor bolts above a bottom of said grout trough, placing grout in said trough below said support flange, lowering said support flange into said engagement with said grout in said trough after said grout cures and post tensioning said load anchor bolts by nuts threaded thereon and engaging an upper surface of said load flange.

17. The method as claimed in claim 15 wherein the step of pouring said cap foundation includes the step of placing crushable material between a bottom surface of said cap foundation and the upper end of the pile anchors to enable downward movement of said cap foundation after curing by

tensioning the pile anchor bolts and moving said cap foundation downwardly thereby compressing underlying soils.